BM

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-046512

(43)Date of publication of application : 14.02.1997

(51)Int.Cl. H04N 1/387
G03G 21/00
H04N 1/40

(21)Application number : 07-195458

(22)Date of filing : 31.07.1995

(71)Applicant : TOSHIBA CORP

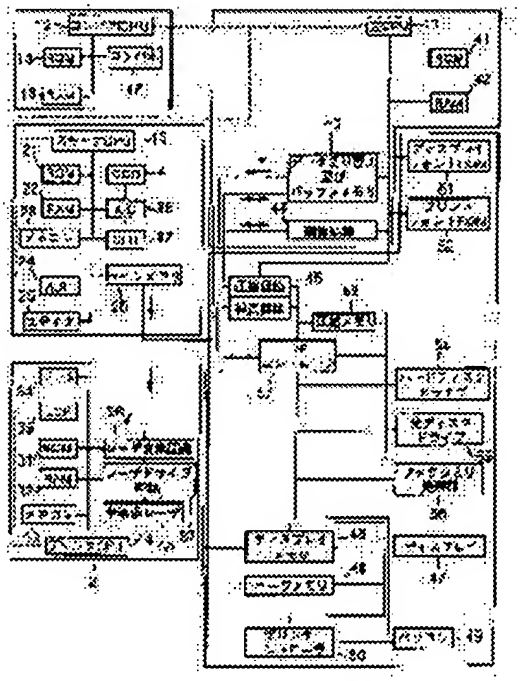
(72)Inventor : MORO AKIHIRO

(54) IMAGE FORMING DEVICE AND ITS METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To select the image quality mode and the resolution automatically depending on a kind of an original by setting the image quality mode depending on a kind of a discriminated original and forming an image based on image data received by a facsimile means.

SOLUTION: When an original is discriminated to be a standard character original, the image quality mode of the image processing is set to be a character mode and the resolution for facsimile transmission is set to be the standard mode. Then the type of original and the setting contents of each mode corresponding to the type of original are displayed on a control panel 17 for the confirmation by the user. Then a transmission size and the resolution are fed to a facsimile processing section 56, by which an original is read by the original reading and the image data are processed in the set image quality mode an the processed image data are fed to a facsimile processing section 56. Then the facsimile processing section 56 sends the data with a usual facsimile transmission protocol in matching with a function of a destination with the transmission resolution and any conversion when the re-conversion of the transmission size is required.



LEGAL STATUS

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] Especially this invention relates to the image formation equipment which has a facsimile function about image formation equipments, such as a copying machine.
[0002]
[Description of the Prior Art] The product which had a facsimile function as a compound machine of a digital copier is already released from each company. When transmitting image data among this facsimile function, they were the phase hand who transmits, the image quality mode of an image processing, the resolution to transmit, and the thing to which a user sets setting out of transmitting size manually as setting out of a facsimile function part.
[0003] Moreover, when the set-up content does not correspond by the device of a transmission place, it has transmitted, after reconverting resolution and transmitting size in the facsimile transmitting processing section. Moreover, about the creation approach of a histogram, the equipment which has a range amendment function as automatic concentration adjustment is developed.
[0004]
[Problem(s) to be Solved by the Invention] When transmitting image data, the user needed to set up setting out of the image quality mode of the image processing of the phase hand who transmits, and the resolution to transmit and transmitting size manually as setting out of a facsimile function part, and troublesome actuation was required of the digital copier with the conventional facsimile function. Especially, these transmitting-mode setting out needed to be carried out to each manuscript unit to transmit simultaneously various kinds of manuscripts, such as an alphabetic character manuscript, a photograph manuscript, and a lightface alphabetic character (small alphabetic character) manuscript.
[0005] Moreover, since the various mode setting at the time of facsimile transmission was manual setting out, there was a possibility of causing a setting-out mistake and a setting-out failure.
[0006] Therefore, the object of this invention is offering the digital image formation equipment which has the function which switches automatically the image quality mode and resolution by the manuscript class, and carries out ** fax transmission.
[0007]

[iMeans for Solving the Problem] In order to attain the above-mentioned object, the image formation equipment by this invention A scan means to scan a manuscript and to offer the image data corresponding to a manuscript image, A facsimile means to transmit input image data to an external communication line, A distinction means to distinguish the class of said manuscript at the time of facsimile transmission, and an image-processing means to process said image data offered from said scan means according to image quality mode, and to transmit the processed image data to said facsimile means, According to the class of manuscript distinguished by said distinction means, a setting-out means to set up said image quality mode of said image-processing means, and a means to form an image based on the image data received by said facsimile means through said external communication line are provided.

[0008] Moreover, a scan means for the image formation equipment by this invention to scan a manuscript, and to offer the image data corresponding to a manuscript image, A histogram creation means to create the histogram of pixel concentration from said image data, A distinction means to analyze said histogram offered from said histogram creation means based on manuscript distinction conditions, and to distinguish the class of said manuscript, A detection means to detect the size of said manuscript, and a facsimile means to transmit input image data to an external communication line according to said manuscript size offered from said detection means, An image-processing means to process said image data offered from said scan means according to image quality mode, and to transmit the processed image to said facsimile means, According to the class of manuscript distinguished by said distinction means, a setting-out means to set up said image quality mode of said image-processing means, and a means to form an image based on the image data received by said facsimile means through said external communication line are provided.

[0009] Furthermore, a scan means for the image formation equipment by this invention to scan a manuscript, and to offer the image data corresponding to a manuscript image, A histogram creation means to create the histogram which carried out density slicing of said image data to the phase of a predetermined number, A distinction means to analyze said histogram offered from said histogram creation means, and to distinguish a manuscript class as one in an alphabetic character, a photograph, and an alphabetic character/photograph, A detection means to detect the size of said manuscript, and a facsimile means to transmit input image data to an external communication line based on the manuscript size detected by said detection means, An image-processing means to process said image data offered from said scan means according to image quality mode, and to transmit the processed image to said facsimile means, A setting-out means to set up said image quality mode of said image-processing means according to the class of manuscript distinguished by said distinction means, A means to form an image based on the image data received by said facsimile means through said external communication line is provided. At the time of facsimile transmission, the class of manuscript is distinguished for every manuscript, and the image data processed by the switch and said processing means in setting out in the image quality mode of said image-processing means

is transmitted to said external communication line.
[0010] Moreover, a scan means for the image formation equipment by this invention to scan a manuscript, and to offer the image data corresponding to a manuscript image, A histogram creation means to create the histogram which carried out density slicing of said image data to the phase of a predetermined number, Said histogram offered from said histogram creation means is analyzed, and a manuscript class is distinguished. The frequency value near the (a) aforementioned manuscript substrate concentration, The frequency value near alphabetic character concentration is added, and this aggregate value is beyond the 1st predetermined value. A 1st distinction means to distinguish said manuscript from an alphabetic character / photograph manuscript when each frequency values of all of medium concentration judge said manuscript to be an alphabetic character manuscript when smaller than the 2nd predetermined value, and a bigger thing than said 2nd predetermined value is in each frequency value of medium concentration, (b) A 2nd distinction means to calculate the black run length who shows relation of the black pixel of the main scanning direction of said manuscript image data, and to distinguish whenever [of said manuscript / minute] based on the maximum of said black run length when said manuscript is judged to be an alphabetic character manuscript, (c) The frequency value near [said] manuscript substrate concentration and the frequency value near alphabetic character concentration are added. When this aggregate value is under the 1st predetermined value, each frequency value in the predetermined concentration field of said histogram altogether from the 3rd predetermined value When large, The distinction means which includes a 3rd distinction means to distinguish said manuscript from an alphabetic character / photograph manuscript when said manuscript is judged to be a photograph manuscript and a thing smaller than said 3rd predetermined value is in each frequency value in said predetermined concentration region of said histogram, An image-processing means to process said image data offered from said scan means according to image quality mode, According to the class of manuscript distinguished by said distinction means, a setting-out means to set up said image quality mode of said image-processing means, and a means to form the image corresponding to the image data processed by said image-processing means are provided.
[0011] Moreover, the image formation approach by this invention scans a manuscript, and the image data corresponding to a manuscript image is offered. Said image data is processed according to the class of manuscript which distinguished the class of said manuscript based on said image data, and was distinguished by said distinction means. The processed image data is offered, facsimile transmission of said processed image data is carried out to an external communication line, and it has the process which forms an image based on the image data received through said external communication line.
[0012] Therefore, as Puri scanning and processing, it asks for transmitting size, a histogram, and the maximum black run length, and the class of manuscript is distinguished based on the calculated value. Even when transmitting the manuscript of various classes using a facsimile function, without a user setting up each mode required for facsimile transmission, a transmitting phase hand is only

set up and optimal image-processing mode, resolution of facsimile transmission, and setting out of transmitting size are automatically performed for every manuscript.

[0013]

[Embodiment of the Invention] Hereafter, one example of this invention is explained with reference to a drawing. Drawing 2 shows the outline configuration of the image formation equipment with which this invention is applied. This image formation equipment consists of the scanner section 1 which reads a manuscript, and the printer section 2 which forms an image on a form according to the picture signal supplied from the scanner section 1 or the external device which is not illustrated.

[0014] The scanner section 1 has the CCD form line sensor 4 as a photo-electric-translation means which carries out photo electric translation of the reflected light from the manuscript by the optical exposure from the fluorescent lamp 3 as the light source which illuminates the manuscript laid on the manuscript covering 109 which can be opened and closed, and which presses down the manuscript laid on the manuscript base 117 in which the manuscript which should be copied is laid, and the manuscript base 117, and the manuscript base 117, and a fluorescent lamp 3. In addition, the lamp heater which is not illustrated as a heating means for heating the tube wall to constant temperature is installed in the fluorescent lamp 3. Moreover, the manuscript scale 91 which dashes the manuscript glass 92 and the manuscript which lay a manuscript, and measures a manuscript location is formed in the manuscript base 117.

[0015] The reflector 115 for completing the light from a fluorescent lamp 3 as a manuscript efficiently is arranged in the side of a fluorescent lamp 3. Moreover, between the fluorescent lamp 3 and the line sensor 4, the lens unit 116 for converging two or more mirrors 112-114 and above-mentioned reflected lights for bending the light which faces to a line sensor 4 from a manuscript, i.e., the optical path by which the reflected light from a manuscript is passed, on the light-receiving side of a line sensor 4 etc. is arranged.

[0016] When the scan system which consists of a fluorescent lamp 3 and mirrors 112-114 carries out reciprocation migration in the direction of arrow-head a along the underside of the manuscript base 117, the exposure scan of the manuscript laid on the manuscript base 117 is carried out at the time of the round trip. In this case, mirrors 113 and 114 move at the rate of one half of mirrors 112 so that the optical path length may be held.

[0017] After the reflected light from the manuscript by the scan of the above-mentioned scan system, i.e., the reflected light from the manuscript by the optical exposure of a fluorescent lamp 3, is reflected by mirrors 112-114, it passes along the lens unit 116, and is led to a line sensor 4, and image formation of the image of a manuscript is carried out to the light-receiving side of a line sensor 4.

[0018] In addition, the scan unit 108 is constituted by a fluorescent lamp 3, a line sensor 4, mirrors 112-114, and the lens unit 116. And a fluorescent lamp 3, a reflector 115, and a mirror 112 are formed in the 1st carriage 111, a mirror 113,114 is formed in the 2nd carriage 110, and such carriage 111,110 is moved by the motor which is not illustrated, respectively.

[0019] The printer section 2 has the photo conductor drum 6 as image support, and while being constituted pivotable towards desired and charged in desired potential by the motor which this photo conductor drum 6 is cylindrical, and is not illustrated, an electrostatic latent image is formed by irradiating the beam light modulated according to print data.
[0020] Around the photo conductor drum 6 As image information which should copy or output the front face of the photo conductor drum 6 to the front face of the charged electrification equipment 102 and the photo conductor drum 6 The toner image on the developer 7 developed by making a toner adhere to the electrostatic latent image formed on the photo conductor drum 6 of the beam light from the laser unit 5 and the laser unit 5 which outputs the laser beam light modulated according to ** print data, and the developed photo conductor drum 6 The imprint equipment 105 imprinted on the form supplied from the feed section 9 mentioned later, the exfoliation equipment 106 which exfoliates the form which adsorbed on the photo conductor drum 6 are arranged in order.
[0021] It is the perimeter of the photo conductor drum 6, and the cleaner unit 104 from which the toner which remained in the front face of the photo conductor drum 6 is removed, and the eraser 107 which eliminates the potential on the photo conductor drum 6 for the next image formation are arranged in the downstream in order rather than exfoliation equipment 106.
[0022] Between a developer 7 and imprint equipment 105, the feed section 9 which supplies the form for imprinting the toner image formed on the photo conductor drum 6 toward between the photo conductor drum 6 and imprint equipment 105 is formed.
[0023] The transport device 103 for conveying the form which exfoliated with the anchorage device 8 and the exfoliation equipment 106 for fixing a toner image to a form toward an anchorage device 8 is arranged in the direction in which the form with which the toner image was imprinted exfoliates with exfoliation equipment 106 from the photo conductor drum 6.
[0024] The form fixed to the toner image with the anchorage device 8 is discharged by the paper output tray 10 with the delivery roller 119.
[0025] Drawing 3 is the block diagram showing the outline configuration of the control system of the above-mentioned image formation equipment. This equipment is controlled by main CPU11, the control panel CPU 12, the scanner CPU 13, and the printer CPU 14. Main CPU11 communicates with a control panel CPU 12, a scanner CPU 13, and a printer CPU 14, and is controlling these.
[0026] It connects with ROM15 and RAM16, and the composite panel (control panel) CPU 12 is performing detection of the switch on a composite panel 17, burning of LED, putting out lights, control of a drop, etc. based on these data. The scanner CPU 13 is performing control of control of the mechanical completions (mechanical component) 23, such as a motor which it is controlled by the communication link with main CPU11, and is not illustrated based on the data of ROM21 and RAM22, and a solenoid, ADF (auto document feeder)24, an editor 25, A/D (analog-to-digital conversion circuit)26, SHD (shading compensation circuit)27, and line memory 28 grade.
[0027] The printer CPU 14 is performing control of control of the mechanical

completions 33, such as a motor which it is controlled by the communication link with main CPU11, and is not illustrated based on the data of ROM31 and RAM32, and a solenoid, a sorter 34, LCF (large cassette feeder)35, the laser modulation circuit 36, and laser drive circuit 37 grade.

[0028] Main CPU11 controls image formation equipment synthetically according to the control program stored in ROM41 and RAM42. A change and buffering of where a data change and buffer memory 43 send the data read in the scanner section 1 and which data to send [and] to the printer section 2 are performed. In the image-processing section 44, a histogram is created from image data, and the circuit which amends image data based on the histogram, and the automatic concentration controller by this invention are prepared. The compression extension circuit 45 performs compression extension of image data, and the page memory circuit 46 stores image data for every page.

[0029] A display memory 48 stores the data of the image displayed on up to a display 47, and a printer controller 50 develops the code data from a personal computer (personal computer) 49 to image data. The display font ROM 51 develops code data on a display memory 48, the print font ROM 52 develops code data on the page memory 46, and the compression memory 53 stores the data compressed by the compression extension circuit 45. The hard disk drive 54 besides the component explained above, the optical disk drive 55, and the I/F controller 57 that performs an interface with the facsimile processing section 56 are connected to main CPU11. The facsimile processing section 56 is transmitted to the external communication line (not shown) by which the processed image data was connected to this equipment, or inputs the image data from an external communication line.

[0030] Drawing 4 is the block diagram showing the outline configuration of the image-processing section 44. The histogram creation circuit 80 creates a gray level histogram from the image data from the scanner section 1. The correction-reference value calculation section 81 computes a correction-reference value (after-mentioned) based on the histogram created in the histogram creation circuit 80. The range amendment circuit 82 amends a concentration range (after-mentioned) using the correction-reference value from the correction-reference value calculation section 81, and carries out automatic concentration adjustment to real time.

[0031] The timing signal generating section 83 generates various timing signals required for each block in the image-processing section 44 based on the clock signal from the clock generation section 84. A low pass filter, a high emphasis circuit, etc. are included, and the image quality improvement circuit 85 improves further the image quality of the image by which range amendment was carried out in the range amendment circuit 82. Amplification/cutback circuit 86 accepts the need, and expands / reduces an image, and the gradation processing circuit 87 processes the gradation of an image using a dither method or an error diffusion method. Thus, the processed picture signal is sent to the printer section 2, and an image is formed.

[0032] Drawing 5 shows the outline of the gray level histogram created by the histogram creation circuit 80. For example, it is 400dpi when reading the image

of one sheet of A4. Supposing it reads, the total number G of pixels is as follows.
[0033]
G= 210x297x(400/25.4) 2 -- several of these pixels -- each pixel of G has concentration and expresses that concentration in 8 bits here. The axis of abscissa in drawing 5 (a) shows this concentration, i.e., a pixel value, and an axis of ordinate is frequency (pixel number) which shows how many pixels of which concentration existed to that concentration.
[0034] As shown in drawing 5 (a), concentration is divided into 16 in this example, and it is simplification ****** to 16 steps about 256 steps of concentration. That is, 4 bits of low order are disregarded in 8-bit pixel value. Hardware is substantially simplified by adopting 16 division. Amount of information required as a histogram is enough secured in the automatic concentration adjustment function also by 16 division. Drawing 5 (b) shows the method of equal 16 division, and, as for the division number 0, the pixel value range is set up by the range of the pixel value 0 - F, and the division number 1 to the division number F like the range of the pixel values 10-1F, and the following.
[0035] Next, range amendment of the correction-reference value calculation section 81 and the range amendment circuit 82 is explained. If range amendment reads a manuscript in digital one to general [which is the function used for the substrate cut by the automatic exposure function in an analog copying machine etc.] and a gray level histogram is created to it, it will become like drawing 6 (a). In the case of a manuscript like a newspaper, since there is substrate concentration considerably, as M of drawing 6 (a) shows, one crest is made into a substrate concentration part, and one crest is made also into an alphabetic character concentration part like N. Here, with the digital copier, although an exposure lamp is controlled by the analog copying machine and the substrate concentration section can be eliminated with it, since it is not made, the same effectiveness has been acquired by the following approaches.
[0036] Concentration DW corresponding to the peak point of the crest of M, and the crest of N shown in drawing 6 (a) when an easy example explains DB It changes into distribution as shows a gray level histogram to drawing 6 (b) by asking and performing the following count. Here, it is concentration DW. DB It is called a correction-reference value and the correction-reference value calculation section 81 computes based on the histogram in each scan line which the histogram creation circuit 80 created.
[0037]
DN =(DI-DW) xFFH/(DB-DW)
It is DI here. Input pixel concentration and DN Pixel concentration and FFH which were amended It is the highest pixel concentration. That is, a range (concentration width of face) between M-N in drawing 6 (a) can be opened in the range of 0-FFh.
[0038] Next, a histogram creation method is outlined. The following equation is a basic formula of the histogram creation in this invention, and a histogram is created for every horizontal-scanning line. Whenever histogram creation processing of one line finishes, the reference value of range amendment is calculated, and range amendment processing is performed based on the

reference value. Moreover, the total number of data which constitutes a histogram is an always fixed value.
[0039] A'=A-alphaA+alphaB -- here -- A' -- the amended frequency (pixel number) corresponding to each concentration of :present line
A : frequency B corresponding to each concentration calculated by even the before line : Frequency alpha corresponding to each concentration of the present line : Weighting-factor weighting-factor alpha is the value applied to the frequency value accumulated with each line, and shows the contribution to a histogram. As shown in drawing 7 , the value of this alpha is set up corresponding to the number of lines, and is chosen from 14 values (1 for a exponentiation of 2), 1 [i.e.,], 1/2, 1/4, 1/8, 1/16, 1/32, ..., 1/2048, 1/4096, and 1/8192 (= 1/213).
[0040] Next, the histogram creation circuit 80 is explained. The histogram creation circuit 80 calculates = A-alpha A about the frequency (A') of each concentration of said histogram, when A'=(A')+alphaB is calculated for every input pixel and pixel concentration is not inputted into the 1st between the following line read from one-line read into one-line read the 2nd. Thus, the histogram creation circuit 80 is the amended frequency value about the present line. A'= A-alpha A+alpha B is generated. Thus, the reference value for range amendment is computed by the correction-reference value calculation section 81 from the created histogram.
[0041] Moreover, histogram creation is provided with the 2 modes, the mode 0, and the mode 1, and one mode is chosen if needed.
[0042] Mode 0: Weighting multiplier fluctuation addition mode mode 1 depending on the number of vertical-scanning lines: The weighting multiplier fixed addition mode mode 0 to an input pixel changes the value of a multiplier alpha according to the number of counts of a horizontal-scanning line, as mentioned above, and it creates a histogram. Regardless of the counted value of a horizontal-scanning line, the mode 1 sets a multiplier constant and creates a histogram.
[0043] Drawing 8 is the block diagram showing the detailed configuration of the histogram creation circuit 80. The pixel concentration signals IDAT4-IDAT7 from the scanner section 1 are inputted into one terminal of a switch 62, and the output-data signals CDT00-CDT03 from a counter 63 are inputted into an other-end child. A switch 62 chooses one of input signals according to the selection signal from the timing signal generating section 83, and outputs the signals SLDT0-SLDT3 after selection to a selector 66 and the clock generation section 64 again. The pixel concentration signals IDAT4-IDAT7 are 4 bits of high orders of pixel concentration, and IDAT 0-3 is disregarded for the reason mentioned above here. The timing signal CTL0 from the timing signal generating section 83 becomes high-level when the pixel concentration signal is not read between each line, and a switch 62 chooses and outputs the signal from a counter 63.
[0044] A counter 63 supplies a value (counted value) required for the clock generation section 64 and a selector 66, when calculating = (A') A-alpha A. A counter 63 generates 4 bit-count value for the output of 16 of the clock generation section 64 being chosen in order, and generating, when the above-mentioned pixel concentration signal is not read. Counter clock signal CT1CK is

inputted from the timing signal generating section 83, and a counter 63 is cleared by counter clear signal CT1CL from the timing signal generating section 83. Counter clear signal CT1CL serves as a low level, when the pixel concentration signal is read, and it clears a counter 63.
[0045] The clock generation section 64 chooses and outputs 1 of the outputs FCK0-F of 16 output with the period of the input-clock signal MCK according to the selection input signals 0-SLDT 3. Drawing 9 shows the relation of the I/O signal of the clock generation section 64.
[0046] Histogram register (flip-flop) 651 -65F The amended frequency (WDAT) to each pixel concentration is latched and outputted at the time of the standup of the input-clock signals FCK0-F. An input signal WDAT is above-mentioned A'. - They are alphaA or (A') +alphaB. histogram register 651 -65F from -- the amended frequency signals H0-HF are outputted also to the correction-reference value calculation section 81.
[0047] a selector 66 -- histogram register 651 -65F from -- the frequency (pixel number) corresponding to 16 steps of each concentration H0-HF is inputted, one data is chosen according to the input signals SLDT0-SLDT3 from a switch 62 among 16 data (each bus width of face of 26 bits) of H0-HF, and Signal HSDT is outputted.
[0048] The number counter 76 of vertical-scanning lines is cleared, whenever the line synchronizing signal HDEN from the timing signal generating section 83 is inputted, it outputs the counted value signals FDAT00-FDAT12 to the clock generation section 75 and an one-page manuscript is scanned by the clear signal CRST from main CPU11, as shown in the timing chart of drawing 15 .
[0049] The output signals FDAT0-FDAT12 from the number counter 76 of vertical-scanning lines and the pixel synchronizing clock signal GCK from the scanner section 1 are inputted, and the clock generation section 75 outputs Signal HCK to a counter 74 and the aggregate value generation section 71. the clock generation section 75 -- the value of Signal FDAT – 1, 3, 7F, 1F, 3F, 7F, 1FF, 3FF, and 7 -- one clock of an input pixel synchronizing clock signal is outputted at the time of any of FF, FFF, and 1FFF. The clock generation section 75 consists of AND circuits, and when the number signal FDAT of lines is "1" altogether (i.e., when it is FDAT=1, 3(11), 7 (111), and F(1111) --), it outputs one clock.
[0050] The clock signal HCK from the clock generation section 75 is inputted, and a counter 74 outputs the counted value signals CDT20-CDT23 to a selector 68, when it is the mode 0. A counter 74 is also cleared for every page by the clear signal CRST from main CPU11. Counted value CDT20-CDT23 is a value for choosing alpha like drawing 7 .
[0051] The fixed factor value register 78 outputs the fixed factor value at the time of the mode 1. A switch 79 changes according to mode signal SL1 from CPU11, is set to a counter 74 side at the time of the mode 0, and is set to a register 78 side at the time of the mode 1.
[0052] The subtraction value generation section 67 outputs "alphaA" at the time of calculating = (A') A-alpha A. The output signal HSDT from a selector 66 is inputted, and the subtraction value generation section 67 generates the value

which did the division of the signal HSDT by the exponentiation of 2 (Signal HSDT is shifted).
[0053] A selector 68 determines "alphaA" of operation (A') = A-alpha A performed when the pixel signal is not read between each line according to input signals SSL0-SSL3. That is, a selector 68 outputs (the value of Signal HSDT) / 213, when the value of input signals SSL0-SSL3 is "1", (the value of Signal HSDT) / 2, and an input value are "2", and an input value is C, (the value of Signal HSDT) / 22, ...,.
[0054] The subtraction section 70 performs subtraction (A') = A-alpha A. The concentration signal HSDT from a selector 66 (A of a top type) is inputted, the number signal SDT of subtraction from a selector 68 (alphaA of a top type) is inputted, and, as for the subtraction section 70, Signal YDAT is outputted as the subtraction result.
[0055] The aggregate value generation section (shift register) 71 generates "alphaB" at the time of calculating A'=(A')+alphaB. The signal HCK of the clock from the clock generation section 75 is inputted, and the aggregate value generation section 71 outputs Signal XDAT to an adder unit 69. The aggregate value generation section 71 is also cleared for every page by the clear signal CRST from main CPU11. Drawing 10 shows the example of an output of the aggregate value generation section 71, and whenever it is initial value output 2000H and the clock signal HCK from the clock generation section 75 enters after that at the time of the input of the clear signal CRST, it outputs one half of actual condition values. Since this output is a hexadecimal, it is set to 1000H one half of actual condition value 2000H, and is set to 800H one half of actual condition value 1000H, for example. Drawing 11 shows change of each signal corresponding to change of Signal FDAT.
[0056] An adder unit 69 performs addition A'=(A')+alphaB. The frequency signal HSDT from a selector 66 and the signal XDAT of the addition data from the aggregate value generation section 71 are inputted, and an adder unit 69 outputs Signal ZDAT as the addition result. Drawing 11 shows the example of addition of Signal ZDAT.
[0057] A switch 77 switches the operation of = (A') A-alpha A and A'=(A')+alphaB. The addition result signal ZDAT from an adder unit 69 is inputted into one terminal of a switch 77, and the subtraction result signal YDAT from the subtraction section 70 is inputted into an other-end child, one input is chosen according to a selection signal CTL1, and it is histogram register 651 -65F about the selection result signal WDAT. It outputs.
[0058] Next, creation of the histogram by the configuration shown in drawing 8 is explained with reference to the timing chart of drawing 13 , drawing 14 , and drawing 15 .
[0059] Drawing 13 is a timing chart which shows the situation when calculating A'=(A')+alphaB for every input pixel in one-line read. Signal MCK is the Maine clock and synchronizes with a pixel signal. Signal VDEN is a page synchronizing signal and Signal HDEN is a line synchronizing signal. The pixel concentration signals IDAT4-IDAT7 from the scanner section 1 are 4 bits of high orders of pixel concentration, and are inputted into a switch 62. The vertical-scanning valid

signal CTL0 is enabling (low level) in this case, and a switch 62 sends inputs IDAT4-IDAT7 to a selector 66 and the clock generation section 64.
[0060] A selector 66 responds to the value of the pixel signals IDAT4-IDAT7, i.e., a selection input signal, and is histogram register 651 -65F. An output (frequency) is chosen and the selected frequency signal HSDT is outputted. The multiplier (XDAT) to which weighting of the signal HSDT is carried out according to the number of lines by the adder unit 69 is added. Since the switch 77 is set to the adder unit 69 side by the input signal CTL1 in this case, the addition result signal ZDAT is histogram register 651 -65F. It returns.
[0061] Next, the clock generation section 64 outputs a clock signal FCK0 - FCKF according to the pixel signals IDAT4-IDAT7. each -- histogram register 651 -65F are the standup of each clock signal FCK0 - FCKF, are each-latched, namely, store the value of the output signal WDAT of a switch 77. About each pixel of one line, by performing the above-mentioned processing, the histogram of one line is generated, the reference value for pixel concentration adjustment is computed, and the reference value is used for processing in degree line.
[0062] Next, when the pixel concentration signal is not inputted between the following line read from one-line read, = A-alpha A is calculated about the frequency (A') of each concentration of a histogram.
[0063] Drawing 14 is a timing chart which shows the situation of the subtraction processing. A switch 62 is switched to a counter 63 side by the selection signal CTL0, and a switch 77 is switched to a subtractor 70 side by the selection signal CTL1. A selector 68 subtracts each histogram value in the multiplier (mode 0:00) or fixed factor (mode 1:00) decided by the number of vertical-scanning counters. After this subtraction actuation finishes, it moves to the usual histogram creation actuation. When the mode is set as 0 by repeating actuation which was mentioned above, whenever it reads each horizontal-scanning line, the histogram of the total amount-of-data regularity is created. In addition, when the mode is set as 1 and a weighting multiplier is made immobilization, the histogram also corresponding to a rapid concentration change of a manuscript image is obtained.
[0064] Below, the function of the facsimile automatic mode setting-out transmission by this invention is explained. Usually, although the aforementioned histogram is used for every reading of each scan line in the range amendment circuit 82, in this example, the histogram obtained, the histogram processing result, i.e., last scan line, after all scan line reading of a manuscript, is used. In addition, this facsimile automatic mode setting-out transmitting function is stored in ROM41 as a program.
[0065] First, the fax number of the phase hand who does facsimile transmission etc. is set up like usual. Before reading manuscript image data, a PURISU can is carried out, histogram processing of a manuscript, black rye length processing, and manuscript size detection are performed, and an image class is distinguished based on the result of these Puri scanning and processing. However, when there is memory which can keep a page image, PURISU can actuation is not carried out, but scanning actuation puts image data into memory only by once, and can also process it later.

[0066] In distinction processing of a manuscript class, the class of manuscript is distinguished from the processing result of a histogram and black run length according to the distinction conditions of each manuscript class. histogram register 651 -65F of the above [the frequency (it is only hereafter indicated as a histogram value) corresponding to each pixel concentration called for by histogram creation actuation in the Puri scanning and processing] from -- it reads by CPU access.
[0067] Moreover, a black run length result reads the value calculated by maximum detection processing of black run length by CPU access from a black run length register (all the registers including this black run length register explained below are prepared in an image processing ASIC). Maximum detection processing of black run length is performed as amendment processing of manuscript distinction, it is the processing which finds the greatest die length (pixel number) of relation (run) of the black pixel of the scan line of a manuscript, and the maximum of the data of all the lines of a manuscript is held.
[0068] However, it is made to process with reference to the black run length of a before line, and parts, such as a ruled line, are canceled. Moreover, maximum detection processing of black run length preparing overflow processing etc. by constraint of circuit magnitude (8-bit width of face), and carrying out a bit limit is also considered.
[0069] Next, the distinction approach of a manuscript class is explained with reference to drawing 16 - drawing 18 . first, an alphabetic character manuscript (it is) like drawing 16 is distinguished. In the case of the manuscript which fulfills the conditions of alphabetic character-likeness, if [with the distinction of alphabetic character manuscript-likeness appropriate for an alphabetic character], it will be distinguished, and it distinguishes an alphabetic character manuscript, and an alphabetic character / photograph manuscript with the magnitude of the medium concentration section further. As for the distinction conditions of alphabetic character-likeness, total of the frequency of the substrate peak P1 [i], the division number P1 of order [i-1], P1 [i+1] and the alphabetic character peak P2 [i], and the division number P2 of order [i-1, P2[i+1] asks for what rate it is from the whole.
[0070] As a condition register of alphabetic character-likeness, an alphabetic character frequency judging threshold is established, and when the above-mentioned total is beyond an alphabetic character frequency judging threshold (Cth), it judges with seemingly it being an alphabetic character.
[0071]
WA1=P1[i-1]+P1[i]+P1[i+1]
WA2=P2[i-1]+P2[i]+P2[i+1]
In WA=WA1+WA2 WA>=Cth, it distinguishes from the manuscript appropriate for an alphabetic character. In other than this, it distinguishes from the manuscript which is not like an alphabetic character at all.
[0072] When it is a manuscript appropriate for an alphabetic character next, as a processing register of a medium density range, a medium concentration judging threshold register is prepared and an alphabetic character manuscript, and an alphabetic character / photograph manuscript are distinguished according to the

distinction conditions of the medium density range A. the distinction conditions of the medium density range A -- substrate peak concentration -- trichotomy -- the large number P1 [i+3] to alphabetic character peak concentration -- trichotomy -- it distinguishes based on the medium concentration judging threshold Pth (frequency) between the small numbers P2 [i-3].

[0073] When all the histogram values in the medium density range A are smaller than Pth, it distinguishes from an alphabetic character manuscript. In other than this, it distinguishes from an alphabetic character / photograph manuscript.

[0074] Furthermore, the manuscript judged to be an alphabetic character performs a judgment, i.e., the judgment of a lightface alphabetic character manuscript, whenever image minute. A lightface alphabetic character manuscript needs to be judged in order to carry out resolution setting out of facsimile transmission. There are a criterion and a high definition in setting out of this resolution, and when judged with a lightface alphabetic character manuscript, resolution is set up with high definition.

[0075] The condition judging of a lightface alphabetic character manuscript prepares a **** judging multiplier and a black run length threshold register as a condition register, and when each histogram values of all in the width of face C of order trichotomy of alphabetic character peak concentration are larger than the lightface judging threshold X, and when the maximum black run length is smaller than a black run length threshold (BKmax), it distinguishes from a lightface alphabetic character manuscript.

[0076]

X= alphabetic character peak value P -- all the histogram values in 2x **** judging multiplier / 16 lightface distinction range C are larger than X, and, in black run length <BKmax, judge with a lightface alphabetic character manuscript. In other than this, it judges with a standard-character manuscript. In addition, this **** judging multiplier is 4.

[0077] Next, a photograph manuscript like drawing 17 is distinguished. The manuscript which carried out the judgment which is not like an alphabetic character at all above distinguishes a photograph manuscript, and an alphabetic character / photograph manuscript according to the distinction conditions of a photograph manuscript.

[0078] The distinction conditions of a photograph manuscript prepare a white width-of-face judging multiplier register as a condition register, and when the histogram value of the width of face B of order trichotomy of a peak P3 is larger than the photograph manuscript judging threshold Z, they distinguish it from a photograph manuscript.

[0079] Z= peak value P3x -- all the histogram values in a white width-of-face judging multiplier / 16 photograph manuscript distinction range B -- a Z twist -- when large, it distinguishes from a photograph manuscript. In other than this, it distinguishes from an alphabetic character / photograph manuscript. In addition, this white width-of-face judging multiplier is 8. The example of the alphabetic character / photograph manuscript judged by classes other than the above-mentioned manuscript distinction result is shown in drawing 18 .

[0080] Moreover, ASIC corresponding to each above-mentioned manuscript

class (application specific IC) The register for image quality mode setting is prepared. This register for ASIC image quality mode setting is a register for setting up the mode which carries out the image processing of the manuscript image, i.e., the image quality mode which switches the parameter which sets to ASIC, according to each manuscript class (the standard character, a lightface alphabetic character, a photograph, an alphabetic character/photograph).
[0081] ASIC image quality mode setting is performing parameter setups, such as an art of range amendment processing of the image-processing section, filter amendment processing in which noise rejection and MTF amendment are performed, amplification/cutback processing, image area discernment processing in which an alphabetic character / photograph / halftone dot field is identified and edit processing, and gradation processing, by CPU access.
[0082] For example, when image quality mode has three kinds, an alphabetic character, a photograph, and an alphabetic character/photograph, it sets up as follows. (a) In the case of a standard-character manuscript, set up image quality mode with a character mode. (b) In the case of a lightface alphabetic character manuscript, set up image quality mode with a character mode. (c) In the case of a photograph manuscript, set up image quality mode with photograph mode. (d) In the case of an alphabetic character / photograph manuscript, set up image quality mode with an alphabetic character / photograph mode.
[0083] Moreover, the register for facsimile resolution setting out corresponding to each manuscript class is prepared. This register sets up the resolution in the case of carrying out facsimile transmission according to each manuscript class (the standard character, a lightface alphabetic character, a photograph, an alphabetic character/photograph). For example, it is performed as follows when resolution has a criterion and the highly minute mode as a facsimile function. (a) In the case of a standard-character manuscript, consider resolution as canonical-mode setting out. (b) In the case of a lightface alphabetic character manuscript, consider as highly minute mode setting. (c) In the case of a photograph manuscript, consider as canonical-mode setting out. (d) In the case of an alphabetic character / photograph manuscript, consider as canonical-mode setting out.
[0084] Next, the example of the procedure of a concrete facsimile automatic mode setting-out transmitting function is explained with reference to the flow chart of drawing 1 . On a composite panel 17, the change-over switch of a facsimile automatic mode setting-out transmitting function etc. is formed (not shown), and the mode in which mode setting is automatically performed at the time of starting of a digital copier, and the mode in which hand control performs each mode setting can be switched.
[0085] The initial value memorized to the power up of a digital copier and nonvolatile memory ROM41 is set as the conditioning register and mode setting register in ASIC. When the facsimile automatic mode setting-out transmitting function is chosen (ST1), it processes with the following procedures.
[0086] First, setting out of a phase hand's fax number etc. which carries out facsimile transmission is performed (ST2). Next, the Puri scanning and processing (ST3) perform manuscript size, i.e., transmitting size detection

processing, histogram processing of the manuscript range, and maximum detection processing of black run length for a manuscript on a manuscript base (ST4). And data are read for the transmitting size of a manuscript, the histogram which divided image concentration into 16, and black run length from the dedicated register of an image processing ASIC by CPU access (ST5).
[0087] Next, manuscript distinction processing is performed from the read histogram. Here, the result of histogram processing is assumed as shown in a table 1.
[0088]
[A table 1]

ヒストグラム結果（主走査画素数 4850画素）

分割番号	ヒストグラム値（画素）	備考
0	582	
1	1018	下地ピーク P1
2	533	
3	242	
4	145	
5	135	
6	121	
7	97	
8	72	
9	87	
A	101	
B	130	
C	271	
D	928	文字ピーク P2
E	291	
F	97	

[0089] First, distinction processing of alphabetic character manuscript-likeness is performed (ST6). An alphabetic character frequency judging threshold (Cth) is made into 3500 pixels.
[0090] WA -- one -- = -- P -- one -- [-- i - one --] -- + -- P -- one -- [-- i --] -- + -- P -- one -- [-- i -- + -- one --] -- = -- 2133 -- WA -- two -- = -- P -- two -- [-- i - one --] -- + -- P -- two -- [-- i --] -- + -- P -- two -- [-- i -- + -- one --] -- = -- 1490 -- WA=WA -- one -- + -- WA -- two -- = -- 3623 -- WA>=Cth -- conditions -- being satisfied -- **** -- since -- an alphabetic character -- a manuscript -- it is -- if -- distinguishing .
[0091] Next, distinction of a medium density range is performed (ST12). A medium concentration judging threshold (Pth) is set to 220 (pixel) here. The medium density range A section is A from the division number 4 like the above-mentioned range, and distinguishes all from an alphabetic character manuscript for a value smaller than a medium concentration judging threshold (Pth).
[0092] Next, the judgment of a lightface alphabetic character manuscript is performed (ST13). A **** judging multiplier is set to 4 and the black run length threshold BKmax is set to 160 (pixel). Since the lightface judging range C is the aforementioned range (width of face of order trichotomy of an alphabetic character peak), it is F from the division number A. When the black run length (the maximum black run length) who processed and read considers as 200 pixels, he is as follows. [of the lightface judging threshold X]
[0093] an X= alphabetic character peak value P2x **** judging multiplier / 16= --

all the histogram values in 928x4 / 16=232 lightface judging range C are larger than X, and in order not to satisfy the conditions of black run length <BKmax, it judges with a standard-character manuscript. next, since the manuscript class was distinguished from the standard-character manuscript, it set up in advance -- like (the aforementioned content of setting out), the image quality mode of an image processing is set up with a character mode, and resolution of facsimile transmission is considered as canonical-mode setting out (C) (ST15).

[0094] Each content of mode setting corresponding to the manuscript class searched for by the above processing and a manuscript class is indicated by the composite panel, and a user is made to check. From the content of mode setting as it is, when there is a problem, after changing the content of mode setting by composite panel actuation, it moves to a facsimile send action.

[0095] Next, image data is processed to the facsimile processing section 56 in the image quality mode which read transmitting size and resolution by delivery and manuscript reading actuation (ST20), and was set up in the manuscript (ST21), and the processed image data is further sent to it to the facsimile processing section (ST22).

[0096] Then, the facsimile processing section transmits, after carrying out conversion etc., when it is necessary to reconvert the resolution and transmitting size to transmit with the usual facsimile transmitting procedure to compensate for a phase hand's function (ST23). It winds per manuscript and actuation of these facsimile automatic mode setting-out transmission is **********.

[0097] In addition, of course, although the case where it applied to facsimile transmission was explained, an automatic mode setting up function can be applied, also when this image formation equipment copies a manuscript image. In such a case, the class of manuscript image is judged automatically and an image is printed in the printer section 2 in the optimal mode.

[0098]

[Effect of the Invention] By this invention, even when transmitting the manuscript with which the class was intermingled with a digital copier with a facsimile function, a user does not need to set up each mode required for facsimile transmission only by setting up a transmitting phase hand. It becomes possible for every manuscript the image quality mode of a manuscript, the resolution which carries out facsimile transmission, and to perform setting out of transmitting size automatically. Moreover, simplification of facsimile functional setting-out actuation of a digital copier is attained, and the setting-out mistake and setting-out failure in various mode setting at the time of facsimile transmission can be prevented.